

# Efficiency Improvement in a Garment Industry of Myanmar through Kaizen Implementation

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## ABSTRACT

Efficiency of a garment manufacturing factory is a very important factor in a competitive market environment. Moreover, quality improvement of the garment industry is essential to increasing productivity and efficiency. The efficiency of the Myanmar garment factory is much lower than the competitors in neighboring nations. The combination of a cost-effective labor force and a strict adherence to product quality are two important factors which make Myanmar an attractive place to source garments and apparel products. The quality and efficiency-reducing problems were found in a garment factory according to the observations. The main aim of this research is to identify the causes that happens the sewing defects and continuous improvements are made through kaizen implementation. This research was made based on a garment factory in Myanmar "Kamcaine Manufacturing Company Limited". The root causes of the defect are found and then these defect problems are solved. Then Kaizen is applied for continuous improvement to reduce the defects. After implementing kaizen tools, the efficiency is increased from 29.07% to 40.82%.

**KEYWORDS:** Kaizen, Efficiency improvement, Sewing defects

**How to cite this paper:** Su Nandar Hlaing | Aung Myo Lwin "Efficiency Improvement in a Garment Industry of Myanmar through Kaizen Implementation"

Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-7 |

Issue-3, June 2023, pp.156-162, URL: [www.ijtsrd.com/papers/ijtsrd56316.pdf](http://www.ijtsrd.com/papers/ijtsrd56316.pdf)



IJTSRD56316

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## 1. INTRODUCTION

The garment industry in Myanmar includes approximately 600 exporting factories employing a workforce of roughly 50,000 and the majority of these workers are young women. The Myanmar garment factory has established itself as an important engine for sustainable development. Myanmar has accepted orders from global companies such as Gap, Adidas, H&M and Marks & Spencer. Leading the country's manufactured goods export sector, Myanmar's apparel exports increased from US \$ 349 million in 2010 to almost US \$4.6 billion in 2018, which represents about 10 percent of export earnings of the country. The country's critical trade CMP (Cut-Make-Pack) manufactured goods to Japan, accompanied by individual European countries, the USA, South Korea, and China. According to the governing facts, 65 percent of the total investment companies in the sector are in China. The Myanmar garment Manufacturers association estimates that its almost 600 member plants offer jobs for nearly 500,000 workers. The greater part of these workers are young girls, so allowing them to be very important. The production line resources are lower

than the competitors in neighboring ASEAN countries. Garment industries in Myanmar are attempting to increase their capacity and output for all time. There are a lot of ways to improve the capacity and output in the garment industry. Product quality is the amount to which a high-quality service or compound to answer a difficulty or meets a requirement. For a manufactured good to have any actual value, there has to exist a few kinds of superiority or, expectantly, a high in quality. Service or compound there of answer a difficulty or meets a requirement or meet a requirement. By making that our manufactured good can be an origin of value [1]. Efficiency is the often measurable capability to keep away from wasting material, energy, efforts, money, and time while doing a task. It is the ability to do things well, successfully, and without waste. Efficiency improvement refers to a process that aims to produce as high profit as possible by having as high income and as low expenses as possible. [2]. Quality improvement (QI) is the structure used to systematically increase procedures and schemes. Just as it sounds, the target of QI is to continuously find

ways to increase the quality of your group's results, which could be manufactured goods, services, or effects [3]. Kaizen is a word in Japan which means to obtain something in order to create it superior. The sewing defects are obtained to decrease the sewing defects rates by applying kaizen methods. Kaizen technique is applied to consecutively increase the defect conditions. Kaizen procedure begins with brainstorming the procedure and then ultimately realizing the action to obtain the results. This research emphasizes on the kaizen implementation to increase the efficiency of Kamcaine Manufacturing company limited.

## 2. Literature Review

Efficiency improvement means the improved value and/or quality that a group gets as a result of an alteration to a service or the methods a service is given. This increase may be at a greater cost but its relative value offsets it [4]. Kaizen tools are used in the increasing efficiency of the garment industry in Myanmar. Kaizen tools are simply the techniques applied to recognize and remove waste in a process. These tools are commonly applied in the producing industry to remove the 'Eight Wastes', namely, Defects, Waiting, Overproduction, Transportation, Non-utilized talent, Inventory, Extra-processing, and Motion. [5] MD. Mijanur Rahman studied that "Quality Improvement in Garment Factory Through TQM Approach". The objective of the study is to increase the excellence of garments by applying TQM Tools. This paper uses statistical process control tools (Check sheet, Pareto analysis, Process flow chart and cause and effect diagram). After applying the TQM tools, the defect significantly decreases. After using the TQM procedure and receiving the proceedings as opposed to the original routes, 53% improvement in defect per hundred units [6]. The apparel manufacturing industry consists of consequent procedures that are focused on uninhibited changes. The factory relies upon the expertise of workers in holding the diversity of cloth and decoration, mechanism as well as confused stitching process. N. J. M. Yusof, T. Sabir and J. McLoughlin surveyed "Quality Approach for mass- product fashion: A study in Malaysian Garment Manufacturing". The major purpose of research is to make sure the quality is approximately arranged by Malaysian apparel manufacturers in three key areas- quality scheme and instrument and type of checking, as well as the example procedure chosen for apparel inspection. This paper uses statistical process control tools and quality assurance. The result of the paper is customer requirement (38.7%) and improvement in the management process (32.3%) [7]. Nitesh Kumar Sahoo and Jajpur, Odisha summarize the

implementation of the traffic light system. The ambition achieved is to decrease the revision rate and get better superiority by removing the escaping of quality. The work offers instructions to manage the refusal and revise through the decrease in defects in the apparel industry by determining the original source and travel light scheme. The objective of this research is to ensure that the manufactured goods have attained that excellence limitation of buyer and to limit the fault that come into the last manufactured goods and to increase the effective by decreasing revise and refusing. The result of the paper is that the DHU proportion was contrasted with the aspect of the primary and secondary conditions and it was surveyed that there was a reduction of 47.6% in the DHU [8]. Md. Syduzzaman studied and implemented the TQM principle in the apparel industry of Bangladesh. The aim of this research is to meet increased customer requirements and increase customer satisfaction. A lot of groups have concentrated on quality and decreased their costs to achieve the highest buyer pleasure. The main difficulty faced by factories in attempting to realize TQM is a lack of finance, restricted human resources and the time required for realizing. The barriers to TQM implementation are cultural barriers, management awareness barriers, financial barriers and training barriers. These barriers should be noticed before implementing them. Before applying the suggested TQM framework", that is, their continuing floor with circumstantial apparel style & order and another following the TQM principles has been considered as "After realizing the suggested TQM framework, both the floors had been studied normally for about a month. From the data mentioned above, total alters and rejections have been considerably reduced after implementing the proposed TQM framework [9]. Tanvir Ahmed did a study about the usage of six sigma towards Quality appearance in Garments Sectors: A case of Bangladesh". The purpose of the thesis is to realize the manufacturing procedures of the apparel industry in Bangladesh and to recognize what profit is obtained by the corporation. This thesis applies Six Sigma DMAIC (define, measure, analyze, improve and control methodology) in the job procedure to discover the main happening imperfection or difficulty and cause and effect diagram, histogram, pareto diagram, scatter plot, flow chart, control chart, check sheets. Viyellatex Ltd has been selected as a six-sigma application apparel industry in Bangladesh and Pawla knit wear limited and Sun knit wear private limited have been selected as a non-six Sigma application in apparel factory. Pawla Knit has imperfection rates of 6.94% and charges them \$ 54652 per month, and if

they accept Six Sigma methodology, the defect speed could be decreased to 3.94%, which will keep them at \$23525 per month. Sun Knit Wear has an error speed of 7.94%, which prices them at \$15721 per month, and if they accept the Six Sigma technique, then the defect speed could be decreased to 4.94%, which will keep them \$23525 per month [10]. This paper is about the efficiency improvement in the garment

### 3. Research Methodology

The efficiency improvement process goes through several steps. The garment industry in this research is "Kamcaine Manufacturing company limited." The defect data have collected, done time study, compute SMV. Table 1 represents the data and figure 1 shows the efficiency improvement process steps.

Steps in the overall efficiency improvements:

Step 1. Factory Selection

Step 2. Data Collection

Step 3. Data analysis

Step 4. Kaizen Implementation



**Figure 1 Efficiency improvement Process**

By applying several steps that are shown below, Kaizen are implemented. Figure 2 stand for the kaizen implementation process.

Step 1. Brainstorming

Step 2. Goal Set up

Step 3. Data Collection

Step 4. Plan

Step 5. Do

Step 6. Check

Step 7. Action

Step 8. Results



**Figure 2. Kaizen Implementation Process**

#### 3.1. Factory Selection

One garment factory from Myanmar was chosen for the practical realization of this research work. This factory is Kamcaine Manufacturing company limited, which is situated in No (186), Ma Kha Ya Min Thar gyi mg pyow street, industrial estate (2) Line Thar Yar Thar Yar Township. This factory has 25 sewing lines and 1527 workers. For this research work, a trouser production line was selected.

#### 3.2. Data Collection

Table 1 shows the frequency of defects on the trouser production line.

**Table 1. Summary of defects for trouser production line**

No	Defect Name	Total defects
1	The thread breaks in the overlock that attach with the side	19
2	Spot	17
3	The overlock mistake	13
4	The thread is not good in the bar tap of the pocket	13
5	Mistake the overlock in the middle line of the trouser	12
6	The batiste break that cut the extra pieces of the waist or belt	11

7	Clip the georgette in the tacking place of the waist	11
8	The clipper scratch little	10
9	The thread falls in the topstitch of the waist	10
10	Miss the georgette pieces in the placket that attach the front pocket and the side	10
11	Clip the georgette of the pocket	9
12	Vacate the extra pieces under the pocket	9
13	The big clearance of the riband happens	8
14	Undo the batiste	8
15	Include the thread line in the line level	6
16	The loop of the pocket overlock bulge	6

### 3.3. Data Analysis

In the trouser production line, the thread breaks in the overlock that attaches to the side is the most frequent defect. The second frequency defect is spot. There are 19 defect frequency of the thread breaks in the overlock that attach to the side, 17 defect frequency of spot, 13 defect frequency of the overlock mistake and the thread is not good in the bar tap of the pocket, 12 defect frequency of the mistake the overlock in the middle line of the trouser, 11 defect frequency of the batiste break that cult the extra pieces of the waist or belt and clip the georgette in the tacking place of the waist, 10 defect frequency of the thread falls in the topstitch of the waist and miss the georgette pieces in the placket that attach the front pocket and the side, 9 defect frequency of the clip the georgette of the pocket and vacate the extra pieces under the pocket, 8 defect frequency of the big clearance of the riband happens and undo the batiste, 6 defect frequency of the include the thread line in 4 line level and the loop of the pocket overlock bulge.

### 3.4. Kaizen Implementation

Kaizen is a fundamental technical analysis, in which the elements of a procedure or technique to comprehend how it employs. Lean manufacturing was discovered on the way to Kaizen. There are several goals of Kaizen, such as quality of manufactured goods, quality of furnishings, quality of procedure and quality of technique. There are 8 types of waste. Kaizen increases the value put on operations in the manufacturing procedure. Kaizen assists in removing wasted motions and hindrances at work. Kaizen realizing procedure and results are presented below to decrease the stitching defects.

#### A. Brainstorming

This is the first step of the kaizen implementation procedure concerned with the problem to explain it. The purpose of the paper is to decrease the source of stitching problems and increase efficiency. Kaizen methods are implemented by admiring some issue. The thread breaks in the overlock that attach with the side is the most frequency defect. The second frequency defect is spot. The first defects are caused because of workforce, method, material, environment and machine. The problems concerned with the workforce could be due to lack of skill, lack of concentration and no checking during work. The problems concerned with the method could be due to don't follow sewing instruction, wrong threading, no predefined SOP (Standard operating Procedure). The problems concerned with the environment could be due to insufficient light, disturbance and noise. The problems concerned with machines could be due to high speed and machine part damage & no regular maintenance. The problems concerned with material could be due to irregular thread tension and the wrong selected needle. The solution to the problems that arise due to the workforce is to improve the skills of the operators and accurate handling of operators. The solution to the problems that arise due to method is that seam instruction was followed properly, material handling was improved, proper threading. The solution to the machine problem is to repair damaged machine parts. The gap between the pressure foot and the hole in the needle plate is reduced. The solution to materials concerned with the problems is sewing thread in accordance with the needle size. A good quality thread which is free from defects is selected. The needle height and testing before bulk sewing is adjusted. The inspection needle is properly mounted on the sewing thread in the right eye position. The solution to environmental problems is that the workers need to work in a place that has sufficient light. The supervisor should notify the operator and worker to work in the workplace quietly. Use the exhaust fan on the sewing floor.

The second frequency defects are spot. The second defects are caused because of workforce, method, material, environment and machine. The problems concerned with the workforce could be due to dissimilar arrangement of body and lacking sincerity for proper cleaning of workers' own area & servicing of machines and dissimilar arrangement of body. The problems concerned with the method could be due to no predefined SOP (standard operating Procedure) and the need for a proper cleaning method. The problems concerned with the environment

could be due to the work area being dirty, cutting & sewing input racks being dirty and garments kept on a machine, floor, and idle sections. The problems concerned with machines could be due to no proper cleaning of the machine, dust & oil spreading beside the machine and dust in the machine & center table. The problems concerned with materials could be due to dyeing spots, deep color (Red, Black, blue) and white color & foreign yarn. The solution to the problems that arise due to workforce is washing your hands before starting work and after lunch. Arrange garment parts and complete the garment properly. Don't let the garment fall down on the floor or be kept in machine parts. The solution to the problems that arise due to the method could be due to establishing preventive maintenance, improving the oil control system of machines, and practicing 5's workplace. Machine cleans, especially needle teeth, needle bar, pressure fit bar, head cover, back cover and inside part of back cover. All screws, gasket edge, oil protector or rubber are tightened, neat and clean. The solution to the problems that happen due to machines must make the cleaning machines properly twice a day. Sincerity or alertness for each section has increased by proper training & increased awareness on the spot, and oil leakages are maintained properly. The solution to the problems that arise due to the material could be due to informing the fabric mill to take care of spots on fabric. The fabric is carried in a poly bag. The solution for the environment could be due to using an exhaust fan on the sewing floor, keeping the floor clean and tidy, a fan and cleaning clean regularly.

## B. Goal Set Up

The purpose is already fit. Kaizen techniques are implemented to decrease the amount of percentage of stitching defects from the manufacturing line to increase efficiency. The source of stitching defects and attempting to increase them as much as probable.

## C. Data Collection

Table 1 stands for the defect data and Table 2 demonstrates the day by day surveyed output of the line. Make a note of kaizen procedure's starting from 1 October 2022 to 12 October 2022 (the first 10 days) and total output per day per line = 213, SMV= 20.97 min, Total manpower per line = 32 Worker hour daily= 8 hours or 480 min.

$$\text{Efficiency} = \frac{\text{Line output} \times \text{Garment SMV}}{\text{no of operator} \times \text{worker hour daily}} \times 100 \quad (1)$$

By using equation (1), we obtained the efficiency before realizing kaizen process is 29.07%.

**Table 2. Day by day studied the output of the line (First 10 days)**

Day	First day	Second day	Third day	Fourth Day	Fifth Day	Sixth Day	Seven Day	Eighth Day	Ninth day	Tenth day
Output	180	180	180	200	200	220	220	250	250	250

**Table 3. Day by day studied the output of the line (Second 10 days)**

Day	First day	Second day	Third day	Fourth Day	Fifth Day	Sixth Day	Seven Day	Eighth Day	Ninth day	Tenth day
Output	250	280	280	300	300	300	320	320	320	320

## D. Plan

This step is the plan for kaizen realizing.

1. Suitable Stitching is needed
2. Obtaining the zero defects target
3. Strictly coming next, the sewing instruction. To keep the line of stitching on line.
4. The operator or worker should follow the sewing instructions and do it.
5. Suitable sewing should be made during the stitching.

## E. Do

Kaizen process realizing according to

1. Workers and operators adapted and use the stitching machine suitably.

2. Allocate a skilled operator or worker to the manufacturing line

3. A good needle, high quality stitching thread and the best necessary equipment should be used.
4. Preserving appropriate time for each process.
5. Apprehensive concerned with the defects.
6. Give the proper training.

## F. Check

1. Start checking the procedure.
2. Checking the plan to realize the procedure.
3. Gauge the process if they are operating or not.
4. Periodically inspect if the defects are decreased or not.

5. If the defects are not discovered or decreasing, then continue the activity of the procedure successfully.

## G. Action

If the defects are still discovered or not decreased at a sure level, we will approach back to the planned step, develop and put some more thought to decreasing or diminishing the defects and go across the cycle again. Bring the actions that help to obtain the needed continuous increase. If there is a defective problem, then create a plan to reduce it.

## H. Results

After implementing the kaizen, the results are finally shown. Total output per day per line = 299 pieces, SMV= 20.97 min, Total manpower per line= 32, worker hour daily= 8 hours or 480 min. By using the Eq. (1), we obtain efficiency of 40.82%. Similarly, the efficiency of the line is calculated according to the implementation process above. Therefore, the defect rate is decreasing and the efficiency of the line is increasing by using kaizen.

## 4. Limitation and Recommendation

There are some limitations in the implementation of the kaizen process. Manufacturing lines are always busy. There is some threat to realizing the kaizen because of the fear of manufacturing interruption in the running manufacturing line. After doing this study, give the proper training to operators and workers about kaizen tools. Each department (store department, cutting department, sewing department, finishing department, Human resource department and other top-level management) should have collaboration and linkage in the production department, a line supervisor in every line, and a quality controller and quality control supervisor in the sewing line and quality controller in other departments should collaborate. Factory management should establish an operation team permanently, which consists of industrial engineers (IE), safety engineers, quality supervisors and technicians for the continuous improvement of the factory. Operation teams should offer the training to line supervisors. IE, Line leader and quality controller about quality tools, lean tools, techniques and kaizen tools. Moreover, the owner of a factory can help workers by offering extra bonuses, food, kindness, safety and care.

## 5. Conclusions

The paper is focused on the efficiency improvement in Kamicine manufacturing companies by limited kaizen implementation. Kaizen is an approach to establishing continuous increases based on the thought that small, continuing positive changes can gather important increasement. The overall productivity, efficiency and the quality are needed to

improve in performing the continuous improvement process. Proper collaboration and teamwork between production engineers, quality supervisors and line supervisors and operators are needed to have in the factory. Before implementing the kaizen process, the efficiency of the production line was 29.07%. After implementing the kaizen process, the efficiency of the trouser production line is 40.82%. For future research, half and one-month improvement plans will be made to obtain better results. Factory owners can do a training program about 5s lean tools, kaizen tools, machine maintenance training, appropriate training on sewing and can send them to an institute to enhance their skills. Improves the efficiency of products after implementing the kaizen tools. This research shows that efficiency improvement can be achieved by implementing kaizen tools and the quality improvement can be obtained by finding the root causes of the problems and solving these problems.

## Acknowledgment

The author would like to express her special thanks to Dr Aung Myo Lwin, Associate Professor, Yangon Technology University, Mechanical Engineering Department, for his useful suggestion and technical guidance. Moreover, the author would like to thank all of my teachers from the Mechanical Engineering Department for their support, encouragement, useful suggestions, invaluable guidance and help till the completion of this thesis. Moreover, the author would like to express her special thanks to all staff and workers in Kamcaine Closing Company Limited, Myanmar, for providing their data information throughout this research.

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